IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# ANALYSIS OF RHIZOME OF *CURCUMA LONGA LINN* WITH SPATIAL REFERENCE TO PHYSICOCHEMICAL AND PHYTOCHEMICAL

[1*]A. G. Godghate, [2]S. N. Sawant, [3]L.V. Wayadande, [4]M. R. Naik, [5]S.A. Masti

[1]Assistant Professor, [2]Post Graduate Student, [3] Post Graduate Students, [4]Assistant Professor, [5]Professor

[1]Department of Chemistry,

[1]Dr.Ghali College, Gadhinglaj, India

***Abstract***: Curcuma longa of ginger family (zingiberaceae) belongs to group of oldest cultivated spice plant in the south – East Asian countries. In present work the qualitative phytochemical from curcuma longa has been analyzed by adapting standard methods. The phytochemical analysis includes alkaloid, saponin, emodins, proteins, amino acids, flavonoid, steroid, tannin, phenol, chalcone, carbohydrates, cardiac glycoside, phlobatannin and leucoanthocyanin. More number of secondary metabolites were present in ethanol extract whereas least number of secondary metabolites in aqueous extract.

The extraction was done by using Soxhlet apparatus. We also determine various physicochemical tests which includes extractable matter, ash content and loss on drying. The characterization was performed using the thin-layer chromatographic method, which revealed four clear spots with distinct $R_f$ values, indicating the presence of pure compounds

***Index Terms*** - Curcuma Longa Linn, Qualitative Phytochemical Analysis and Physicochemical Screening.

## I. INTRODUCTION

The analysis of medicinal plant had a long history. Medicinal plants have been resource for healing in local communities around world for thousands of years. Still it remains of contemporary importance as primary healthcare mode for approximately 85% of world's population (Fizgerald.M. et al 2020). It has greater certainty of not only quality of plant and medicines but also of their suitability for clinical research (Pesic 2015).

Turmeric is a plant that has been used for medicinal purposes for almost 4000 years (Godghate. A et al 2013). It is considered extremely auspicious for Hindu rituals and is also used in spiritual ceremonies. Traditionally, it is referred to as Indian saffron. The yellow color of turmeric is attributed to the presence of curcumin (Hasegewa, et.al 2015).

Turmeric is utilized in the food and textile industries (Susanna et al., 2012). Its poor bioavailability is attributed to its hydrophobic nature and limited water solubility (Bhowmik et al., 2009). Its use for various disease indications primarily stems from its active biological functions. Turmeric possesses strong antioxidant, anti-inflammatory, antifungal, and anticancer properties (Nasri et al., 2014).

From the aforementioned properties, it is evident that turmeric plays a vital role in both human and animal life. However, there is a lack of studies on physical and chemical properties of turmeric, which limits its applications in daily life. Therefore, further investigations are needed to enhance the utilization of turmeric in everyday life and medical purposes. In this context, the present work aims to investigate the physicochemical and qualitative phytochemical investigation of the rhizome of Curcuma Longa Linn

# II. RESEARCH METHODOLOGY

## I- MATERIAL AND METHODOLOGY

The plant material (rhizome) of Curcuma longa was collected from Madhyal Village of Kolhapur district in March 2023. The plant material was authenticated by Dr. S. M. Patil of department of Botany; Dr.Ghali College, Gadhinglaj. The rhizomes were cut into small pieces, dried in shade, and then ground into a fine powder using a mortar and pestle.

## II- CRUDE EXTRACTION

A 50 gm powdered sample of the rhizome of Curcuma longa was weighed using a microbalance. A solvent of 300 ml ethanol was taken. The sample was then extracted using a Soxhlet apparatus for six hours at a temperature of 60°C (the temperature depends on the solvent used). The resulting filtrate was evaporated to dryness at room temperature under shade. This process was repeated five times until a sufficient amount of extract was obtained. Similar methods' were adopted for acetone, chloroform and water.

## III- PHYSICOCHEMICAL ANALYSIS

All the Physicochemical parameters were analyzed by adopting the standards methods of WHO, 1998. It Includes Water extractive matter, Ethanol extractive matter, Total Ash, Acid insoluble Ash, Water soluble Ash and Loss on drying. Results are shown in Table 4.1

.

## IV QUALITATIVE PHYTOCHEMICAL ANALYSIS

The individual extract was subjected to the qualitative phytochemical screening for the presence of some chemical constituents. Phytochemical test were carried out adopting standards procedure (Trease et.al 1983, Kokate et.al 1997 and Hegde et.al 2010). Results are shown in Table 4.2.

### 1. ALKALOID

A quantity (3 ml) of concentrated extract was taken into a test tube and 1 ml HCl was added the mixture was heated gently for 20 min cooled and filter, the filtrate was used for following test.

a) **Wagner test**: 1ml of the extract was treated with Wagner's reagent; formation of brown reddish precipitate indicates presence of alkaloids.

b) **Dragendroff's test**: 2 drops of Dragendroff's reagent were added to 1ml of the extract. The development of a creamy ppt was indicative of the presence of alkaloids.

c) **Hager's test**: 1ml of the extract was treated with Hager's reagent, presence of alkaloids confirmed by the yellow colored precipitate.

### 2. SAPONIN

5 ml extract was mixed with 20 ml of distilled water then agitated in graduated Cylinder for 15 min formation of foam indicates Saponin.

### 3. STEROID

1ml extract was dissolved in 10 ml of chloroform & equal volume of concentrated $H_2SO_4$ acid was added from the side of test tube .The upper layer turns red and $H_2SO_4$ layer showed yellow with green fluorescence .This indicates the presence of steroid.

### 4. TANNIN

4 ml extract was treated with 4 ml $FeCl_3$ formation of green color indicates that, there is presence of condensed tannin.

### 5. ANTHOCYANIN

2 ml of aqueous extract is added to 2 ml of 2N HCl & $NH_3$, the appearance of pink red turns blue violet indicates presence of Anthocyanin.

### 6. COUMARIN

3 ml of 10% NaOH was added to 2 ml of aqueous extract formation of yellow color indicates Coumarin.

**7. EMODINS**

2 ml of $NH_4OH$ and 3 ml of benzene was added to extract appearance of red color indicates presence of emodins.

8. **PROTEINS**

**Xanthoproteic test**: Extract was treated with few drops of concentrated $HNO_3$ formation of yellow indicates the presence of proteins.

**9. AMINO ACIDS**

**Ninhydrin test**: To the 2 ml extract 2 ml on Ninhydrin reagent was added & boil for few minutes, formation of blue color indicates the presence of amino acid.

10. **FLAVONOID**

a) **Alkaline reagent test**: Extract was treated with 10 % NaOH solution, formation of intense yellow color indicates presence of Flavonoid.

b) **$NH_4OH$ test**: 3 ml of extract were 10 % $NH_4OH$ solution development of yellow fluorescence indicates positive test.

c) **Mg turning test**: Extract were treated with Mg turning and add conc. HCl to this solution add 5 ml of 95 % ethanol, formation of crimson red color indicates Flavonoid.

d) **Zn test**: 2 ml extract were treated with Zn dust and conc. HCl development of red color indicates presence of Flavonoid.

**11. DITERPENES**

**Copper acetate test**: Extract were dissolved in water and treated with 10 drops of copper acetate solution, formation of emerald green color indicates presence of Diterpenes.

**12. PHYTOSTEROL**

**Salkowski's test**: Extract was treated with chloroform and filtered. The filtrate was treated with few drops of concentrated $H_2SO_4$ and shakes, allow standing, appearance of golden red indicates the positive test.

**13. PHENOL**

**Ferric Chloride test**: Test extract were treated with 4 drops of Alcoholic $FeCl_3$ Solutions, Formation of bluish black color indicate the presence of Phenol.

**14. PHLOBATANNIN**

Deposition of red ppt when aqueous extract of each plant sample is boiled with 1% aqueous HCl was taken as evidence for presence of Phlobatannin.

15. **LEUCOANTHOCYANIN**

5 ml of isoamyl alcohol added to 5 ml of aqueous extract, upper layer appear red in color indicates the presence of Leucoanthocyanin.

16. **ANTHRAQUINONE**:

5 ml of Extract was hydrolyzed with dilute $H_2SO_4$ and then add 1 ml of benzene and 1 ml of $NH_3$, formation of Rose Pink coloration suggest Anthraquinone.

17. **CHALCONE**:

2 ml of $NH_4OH$ was added to 0.5 ml ethanolic extract, appearance of red color showed presence of chalcone.

18. **CARDIAL GLYCOSIDES:**

**Legal's Test**: To the extract 1 ml of pyridine and few drops of freshly prepared sodium nitroprusside solution were added, appearance of pink to red color indicates presence of glycosides.

**Keller-Killani Test**: Plant extract treated with 2 ml glacial acetic acid containing a drop of FeCl3 .A brown color ring indicates the presence of positive test.

**19. CARBOHYDRATE**:

Extract were dissolved individually in 5 ml of distilled water and filtered. The filtrate was used for the following test.

a) **Molisch's Test**: Filtrate were treated with 2 drops of alcoholic _-naphthol solution, formation of violet ring at the junction indicates the presence of carbohydrate.

b) **Barfored's Test**: Take 1 ml of test solution add 1 ml of Barfored's reagent in a test tube, then keep this test tube in boiling water bath, brick red colored precipitate is formed at the bottom indicating carbohydrate

c) **Iodine Test**: 2 ml of extract were treated with 5 drops of Iodine solution, gives blue color indicates the positive test.

d) **Fehling Test**: 2 ml of extract were hydrolyzed with dilute HCl and neutralized with alkali & heated with Fehling's solution A and B, formation of red ppt indicates the presence of reducing sugar.

e) **Benedict's test**: Filtrate were treated with Benedict's reagent and heated gently, orange red ppt indicates the presence of reducing sugar

## V. CHARACTERIZATION:

Thin Layer Chromatography (TLC)

For TLC, we are taking 19: 1 ratio of Chloroform and Ethanol. .

TLC Plate of Curcuma Longa Linn

Rf Values of all Spots.

| Solvent | Distance travelled by Solute | Distance travelled by Solvent | Rf Value |
|---|---|---|---|
| Acetone | 0.5 | 7.2 | 0.069 |
| | 1.3 | 7.2 | 0.180 |
| | 2.1 | 7.2 | 0.291 |
| | 3.5 | 7.2 | 0.486 |
| Ethanol | 0.6 | 6.5 | 0.092 |
| | 1.4 | 6.5 | 0.215 |
| | 2.0 | 6.5 | 0.307 |
| | 3.3 | 6.5 | 0.507 |

## IV. RESULTS AND DISCUSSION

Table 4.1 Physico-chemical analysis of Rhizomes of Curcuma Longa Linn

| Physicochemical Parameter | Percentage |
|---|---|
| Extractable Matter<br>a. Determination of water extractive | 7 |
| b. Determination of ethanol extractive matter | 5.3 |
| Ash Content<br>a. Total Ash | 6.94 |
| b. Acid insoluble ash | 2.562 |
| c. Water soluble ash | 0.10 |
| Loss on drying | 7.26 |

The Physico-chemical analysis of rhizomes of Curcuma Longa was determined by adopting the standard procedure. The results were given in Table 4.1 Water extractive value was found to be 7 %, Total Ash content was 6.94 % whereas loss on drying was reported 7.26 %.

Table 4.2: Qualitative Phytochemical analysis of Rhizomes of Curcuma Longa Linn

| Phytochemical | Acetone | Ethanol | Chloroform | Water |
|---|---|---|---|---|
| Alkaloids<br>a. Wagner Test | + | + | - | - |
| b. Dragendroff's Test | + | + | + | - |
| c. Hager's Test | + | + | + | - |
| Saponin | + | + | + | - |
| Steroid | + | + | - | - |
| Tannin | - | + | - | - |
| Anthocyanin | + | + | - | - |
| Coumarin | - | - | - | - |
| Emodins | + | + | - | - |
| Proteins | - | - | - | + |
| Flavonoid<br>a. Alkaline Reagent | - | - | - | - |
| b. $NH_4OH$ Test | - | - | - | + |
| c. Mg turning test | + | - | - | - |
| d. Zn test | + | + | + | - |
| Diterpenes | - | - | + | + |
| Phytosterol | + | + | - | - |
| Phenol | + | + | - | - |
| Phlobatannins | + | + | - | - |
| Leucoanthocyanin | - | - | - | - |
| Anthraquinone | + | + | + | + |
| Chalcone | + | + | - | - |
| Cardiac Glycoside<br>a. Legal's Test | + | + | + | - |
| b. Kellar-Killiani test | + | + | + | - |
| Carbohydrate | + | + | + | - |
| a. Molisch's | + | + | + | + |
| b. Barfaed | + | - | - | - |
| c. Iodine | + | + | - | - |
| d. Fehling | - | + | + | - |
| e. Benedict | - | - | - | - |

In the present study, we have analyzed qualitative 19 phytochemical from rhizome of curcuma longa. The results were shown in Table 4.2 As per our result, ethanolic extract consist of more phytochemical as compare to water, chloroform and acetone. TLC shows four clear spots with different Rf values indicate the presence of four pure compound. Similar work has been done by Saxena Jyoti, et.al (2012) and Godghate, et al (2013).

## REFERENCES


**[1]** Bhowmik. D, K. P. Chiranjib, Sampath Kumar, B. Jayakar. 2009. Turmeric: An herbal and traditional medicine", scholars research library 1(2) : 86-108.

**[2]** Fizgerald .M, M. Heinrich and A Booker 2020. Historical and regional discussion of emergent complex technique", medicinal plant analysis, 10 (1480) : 1-14.

**[3]** Godghate A, Sawant R 2013.Qualitative Phytochemical Screening of rhizome of curcuma longa linn". International Journal of Science, Environment and Technology, 2(4): 634-641

**[4]** Hasegawa. T, Nakatani. K, Fujihara. T, Yamada. H 2015. Aroma of turmeric: Dependence on combination of Group of several odour constituents" Natural Product Communication 10(6): 1047-1050.

**[5]** Hegde Karunkar and Joshi Arun B 2010. Preliminary Phytochemical Screening and Antipyretic Activity of Carissa Spinarum Root Extract Scholars Research Library Der Pharmacia letter, 2(3): 255-260.

**[6]** Kokate C. K, Purohit A.P. and Ghokhale S.B 1997. Pharmacognosy, Nirali Prakashan, Pune, India.

**[7]** Nasri H, Satinfard N, Rafieian. M, Rafieian.S, Shirzad. M 2014. Turmeric: A Spice with multifunctional medicinal properties. Journal of Herbmed Pharmacology 3(1) : 5-8.

**[8]** Pesic .M. 2015.Development of natural product drugs in suitable manner. Brief for United Nations Global sustainable Development report,1-4.

**[9]** Quality control method for medicinal plant materials 1998.World Health Organization. Geneva.

**[10]** Saxena Jyoti and Sahu Rajeshwari 2012. Evaluation of Phytochemical constituents in Conventional and Non-conventional species of Curcuma. International Research Journal of Pharmacy, 3(8): 203-204.

**[11]** Susanna Zetterstrom 2012.Isolation and Synthesis of curcumin, Bachelors Thesis- 05-31.

**[12]** Trease GE, Evans. WC. 1983.Textbook of pharmacognosy 12th edn. Balliese Tindall and company publisher, London, 343- 383.